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JTAC AND FAC(A) TRAINING: HOW HISTORY ILLUSTRATES THE PATH TO THE FUTURE

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Executive Summary

Title: JTAC and FAC(A) training: How History Illuminates the Path to the Future

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Thesis: Current USMC JTAC and FAC(A) training is unfocused and out of touch with both historical trends and the modern battlefield. Controller training and manning must be reexamined and refocused to ensure it remains relevant in the future.

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Discussion: Many characteristics have remained constant throughout the development of CAS and FAC(A) mission areas. For example, if aviation ordnance is going to be delivered in close proximity to troops, then it must be delivered with precision. Additionally, if aviation fires are going to be responsive, and coordinated with the ever-changing fires and maneuvers of ground elements, then communications between air and ground must be reliable. Detecting, locating, marking and attacking targets are another constant challenge in all combat environments, and require a high degree of teamwork and coordination between air and ground personnel. Also, distinguishing between friendly and enemy ground forces from the air is difficult, and requires a detailed understanding of the friendly situation. Finally, accomplishing these tasks and overcoming these challenges requires teams of highly trained specialists who are familiar with coordination air fires with ground fires and maneuvers. All of these trends have persisted despite advances in tactics and technology, and in the face of an ever changing threat. Currently, however, the minimum standards outlined in the TACP and FAC(A) T&Rs are well off the mark and do not sufficiently incorporate these historical lessons.

Conclusion: The Marine Corps should focus on training more JTACs, and making them better. Further, because the situations where a FAC(A) will likely be required in the future are somewhat limited, and likely involve a high degree of risk, the remaining FAC(A)s should reside in squadrons where FAC(A) training is a core skill, and where the training and proficiency standards are high.

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From the days of the very first combat flights, coordinating the actions of military aviation with that of ground forces has been a constant challenge. There are several trends that have recurred throughout history that continue to challenge aviators and Forward Air Controllers (FACs) even today. The aviation missions of Close Air Support (CAS) and Forward Air Control (Airborne) (FAC(A)) have evolved throughout the years, but certain characteristics have remain unchanged. By examining these characteristics, and contrasting them with current doctrine, it is apparent some changes need to take place in current USMC Joint Terminal Attack Controller (JTAC) and FAC(A) programs. Specifically, current USMC JTAC and FAC(A) training is unfocused and out of touch with both historical trends and the modern battlefield. Controller training and manning must be reexamined and refocused to ensure it remains relevant in the future.

Many characteristics have remained constant throughout the development of CAS and FAC(A) mission areas. For example, if aviation ordnance is going to be delivered in close proximity to troops, then it must be delivered with precision. Additionally, if aviation fires are going to be responsive, and coordinated with the ever-changing fires and maneuvers of ground elements, then communications between air and ground must be reliable. Detecting, locating, marking and attacking targets are another constant challenge in all combat environments, and require a high degree of teamwork and coordination between air and ground personnel. Also, distinguishing between friendly and enemy ground forces from the air is difficult, and requires a detailed understanding of the friendly situation. Finally, accomplishing these tasks and overcoming these challenges requires teams of highly trained specialists who are familiar with coordination air fires with ground fires and maneuvers. All of these trends have persisted despite advances in tactics and technology, and in the face of an ever changing threat.

The need for precision ordnance delivery in close air support became apparent at a very early stage in the development of military aviation, and many different methods have been used to achieve it. Early discussions involved contrasting the benefits of dive bombing versus low altitude strafing, both of which allowed attacking aircraft to acquire hostile targets, distinguish them from friendly positions, and minimize the risk of fratricide. The French recognized the importance of dive-bombing and its accuracy during the Moroccan "Rif" wars of the 1920's. The U.S. Marine Corps depended on the accuracy of dive-bombing in Nicaragua in 1927 at Octal, where Augusto Sandino's rebel forces cut off a small detachment of Marines.[1] In 1939, the British air ministry had this to say about the subject: "It must be borne in mind that the whole essence of a successful dive bombing attack lies in the accuracy of the first bomb as in time of war only one attack may be possible." This need for accuracy was understood by all sides throughout the war, although the Germans embraced dive-bombing, particularly with their Stukas supporting the "Blitzkrieg" tactics of the armored divisions, to a much greater extent than the allies in the rest of the theater. The precision of the German air attacks was devastatingly effective.

During the Korean conflict, the "Mosquito's" of the U.S. Air Force's 6147th Tactical Control Group were among the first FAC(A)'s employed in combat, and increased precision of air attacks was one of the primary reasons cited for their success.[2] The Korean War saw the introduction of jet aircraft in the CAS role for the first time, but ironically, some of the greatest strengths of jet aircraft, their high speed and high altitude capability, were actually limitations in the CAS role because they limited the ability of those jet aircraft to acquire ground targets and distinguish them from friendly forces. The limited on station time of jet aircraft didn't help the situation much either. The Mosquitoes, with their lower flying and slower aircraft, were able to

stay on station in a particular area of operations for an extended time, coordinate with ground forces in the area, identify and mark targets, and coordinate the strikes of the jet aircraft. This effectively mitigated many of these limitations and greatly increased the precision of air attacks. During the Vietnam conflict, the FAC(A) tactics and techniques developed during Korea were refined, and other methods were also developed to ensure accuracy of CAS attacks. At the Battle of Khe Sanh in 1968, up to 5 FAC(A)'s were airborne at any given time to coordinate attacks and ensure the accuracy of CAS aircraft in support of 26th Marines. [3]

Another notable example of the importance of precision in CAS is the use of ground-controlled radar bombing. The Air Support Radar Team Bravo (ASRT-B) of Marine Air Support Squadron 3 (MASS-3) deployed to Khe Sanh in January of 1968, and was able to use ground control radar and a targeting computer to coordinate airstrikes with devastating precision. This system could be used day or night, in all weather conditions, and it allowed the attack aircraft to deliver ordnance from an average altitude of 14000'. One Marine remarked that he was confident enough in the system to deliver ordnance within 35 meters of a friendly position, if necessary. Because of its accuracy, as many as 4,989 attacks were controlled by the ASRT-B in support of 26th Marines.[4]

In addition to the ASRT, Vietnam saw the introduction of yet another advance in precision air attacks: The Laser Guided Bomb (LGB). Testing began on the Paveway I LGB in 1967, and by 1969 1601 LGBs had been employed in Vietnam, %85 of which hit within 9.6 feet of the intended target, %61 of which were direct hits. By 1972, LGBs were being used to target key bridges and infrastructure near populated areas that were off limits to unguided attacks for fear of collateral damage, as well as North Vietnamese Army (NVA) and Viet Cong units that were in close proximity to friendly forces. [5]

> "Guided weapons were important in the attacks on North Vietnam for two major reasons. First, laser weapons allowed fewer aircraft to do greater damage, not only putting fewer men and machines at risk, but getting the job done the first time. In view of the effective North Vietnamese defenses, this was critical. Second, they achieved accuracies that permitted employment in close proximity to civilians, dikes, and the like."[6]

In the years following Vietnam, the development and introduction of the JDAM brought a great deal of precision capability to the CAS mission. During Operation Desert Storm, approximately 210,000 of the 250,000 bombs dropped by coalition aircraft were unguided and postwar analysis showed that these unguided munitions fell within about 200 feet of their target, on average. In addition, analysis showed that LGBs accounted for nearly %75 of the effective attacks by U.S. aircraft despite being less than %16 of the weapons dropped.[7] Unfortunately, LGBs were expensive, and they couldn't be employed by all of the attack aircraft, or any of the bombers, in the U.S. inventory. Further, LGBs were generally ineffective in bad weather. The JDAM was the solution to this problem.

Operation Allied Force (OAF) in 1999 was the first combat employment of JDAM for CAS as well as air strikes controlled by FAC(A)s and JTACs. In OAF, the political nature of the North Atlantic Treaty Organization (NATO) coalition placed severe restrictions on airstrikes. The concern for human rights resulted in a very low tolerance for collateral damage. As a result, FAC(A)s were required to visually acquire targets, and then receive visual confirmation from attack aircraft to ensure accuracy. Precision guided munitions, such as the Joint Direct Attack Munition (JDAM) and Laser Guided Bombs (LGB) were the main weapons used.[8] The first aircraft to drop a JDAM in OAF was a B-2, proving that bombers were now capable of the same precision and accuracy that previously was only possible with lower flying attack aircraft. Soon

after, F/A-18s and B-52 were dropping JDAM as well. In all, OAF saw 652 JDAM employed, %98 of which hit their targets.[9]

Operation Enduring Freedom (OEF) in Afghanistan was the next major conflict where precision munitions were essential for CAS. In first 9 weeks of the conflict, the U.S. Air force alone dropped early 5000 JDAM. Both bombers and attack aircraft were used for CAS missions, and the precision air attacks, provided by LGBs and JDAM, was an essential element in their success. [10]

> "'The rapid collapse [of the Taliban and al Qaeda] across Afghanistan ... was a direct result of being able to tie incredibly precise applications of airpower to incredibly brave people on the ground, with the capabilities to bring JDAM and [laser guided] weapons to bear on a very mobile and elusive opponent,' said Gen. T. Michael Moseley, who commanded coalition air forces in [Afghanistan]."[11]

Throughout Operation Iraqi Freedom, precision ordnance delivery and minimizing collateral damage have been a consideration for all fires delivered.[12] In the first few months of OIF, U.S forces expended nearly 6500 JDAM on many different types of targets.[13] The complexities of CAS in Urban terrain and the political sensitivities of counter-insurgency have further increased the need for precision air attacks.

> "For instance, in fierce fighting against insurgents for control of the cities of Fallujah and Ramadi, Marine F/A-18s made extensive use of a variant of the 500-pound JDAM that minimizes collateral damage. The Marines hit buildings, barriers, and even roadblocks with JDAMs."[14]

The introduction of the JDAM was not without complications, however. Specifically, the JDAM accuracy is completely dependent on accurate target coordinates, and developing these target coordinates requires a great degree of skill on the part of the JTAC or FAC (A). As such, it is imperative that the systems and Tactics, Techniques, and Procedures (TTPs) that are necessary for effective employment of JDAM be a regular part of any JTAC or FAC(A) curriculum. Beyond the JDAM, however, it is clear that precision of all sorts is a requirement for CAS, and that both JTACs and FAC(A)s must be trained in modern systems and tactics to ensure accurate ordnance delivery.

Early attempts at Air-Ground communication were rather limited, as exemplified by this account of the activities of the United States Air Service in Mexico in 1919 from Major James P. Yancey:

> "The Airplanes worked well with the troops and furnished valuable information as to the movements of Mexican troops, located water and camping places, and furnished a quick means of communication with Headquarters at Marfa. Much was learned by both branches regarding cooperation and the needs of the other. Observers made sketches of the country in our front and dropped them to us. Pilots would locate water, then come and circle over our Column and fly directly to the water and circle. Message bags furnished a good means of communication from air to ground" [15]

Even in these early days, the importance of air-ground communication was recognized. During World War II, the Germans initially used telephones to communicate with the aircrew while they were on the ground, but this method didn't allow for updated communications after takeoff. The addition of a Stuka UHF radio set to a tank in the Panzer force allowed real time communication between air and ground, and greatly increased the flexibility of close air support. Additionally,

the Germans assigned Fligerverbindungsoffiziere, or Flivos, to act as air liaison officers between the Luftwaffe and the Wehrmacht Heer. [16] Many of the techniques used by the German Military during World War II were developed by the Condor Legion under the leadership of Wolfram von Richthofen.

> "...The Condor Legion had evolved a system that insured close planning between ground and air units, established communication links and recognition devices, and detailed Luftwaffe officers to serve directly with frontline units... In retrospect, Richthofen had really only managed to reintroduce German Close Air support doctrine as it had existed at the end of World War I. Recognition devices, liaison officers, telephone and radio communications had all been used during the 1918 spring offensives."[17]

In the Pacific theater, UHF radios were used regularly for air-ground communications. In fact, in 1944, the Standard Operating Procedure (SOP) was for each regiment to have an Air Liaison Party (ALP) assigned to it with responsibility for communicating "the position of friendly troops, the location of good targets, and the results of close support missions" to supporting aircraft.[18]

In Korea, the mountainous terrain made radio communications difficult, which was another reason the Mosquito's were adopted. Their ability to fly above the terrain allowed them to maintain line of sight radio communications between air and ground units. The mountainous terrain, humidity, and jungle canopy in Vietnam also created communication problems, which were mitigated through the use of FAC(A)s.[19] Following the 1973 Yom Kippur War between Egypt and Israel, the reliability of modern tactical radio communications was called into question. Soviet era Electronic Warfare (EW) equipment was used by the Egyptians to jam Israeli communications and disrupt their CAS missions. Developing tactics to counter this threat and maintain reliable communications was a major concern in the U.S.M.C in the mid 1970's,

and many of the tactics we practice today still reflect this concern.[20] In OIF, modern CAS aircraft can often share video and imagery with JTACs and FAC(A)s via digital and analog data links, further enhancing communication. [21] As a result, it is clear that JTACs and FAC(A)s must be equipped with state of the art communication equipment, and have the necessary training to use such equipment.

Target detection and identification is a constant challenge in the CAS environment. In the days preceding World War II, combat aircraft generally flew low enough to visually identify targets, and were close enough that they could readily distinguish enemy from friendly. As aircraft became more technologically advanced, however, it became increasingly difficult to do this. Higher altitudes and greater airspeeds created ever increasing challenges for aircrew trying to establish a common frame of reference with ground forces, find targets, and distinguish enemy from friendly. In World War II, air panels, colored panels that were visible from the air, were used to distinguish friendly forces, while colored flares were fired at the target to help identify it to friendly attacking aircraft. These techniques were not flawless, however.

Similar techniques were used in Korea, but the Chinese quickly learned to mimic the Allied air panels, and on some occasions managed to confuse friendly support aircraft.[22] As aerial observers, the Mosquitoes were dreaded by the North Koreans and the Chinese. The Mosquito two-man crew consisted of an Air Force pilot, familiar with the capabilities of strike aircraft, as well as an Army forward observer, who knew from experience where to look for and how to identify enemy ground positions. This combination allowed for devastating effectiveness.[23]

During the Vietnam conflict, the mountainous terrain, harsh monsoon seasons, and thick jungle canopy made it very difficult to detect and identify enemy positions. As a result, by 1966

there were 250 FAC(A)s working the skies over South Vietnam, as well as clandestine FAC(A) units such as the Ravens working in Laos. These FAC(A)s initially flew low and slow flying observation aircraft, such as the 0-1E Bird Dog and the OV-10 Bronco, and spent the bulk of their time conducting visual reconnaissance between 1000' to 1500'. FAC(A) crews were generally assigned to specific areas so they could become familiar with the terrain and learn the normal patterns in the region. This knowledge became very useful for finding the enemy. Experienced FAC(A)s would look at the rivers to see if sediment had been kicked up by crossing guerillas, or examine clotheslines in remote villages to see if anyone new had taken up residence.[24] These types of indications were only apparent to experienced observers, however.

Increases in the North Vietnamese air defenses eventually rendered the slow moving Bird Dog and Bronco FAC(A)s unusable in certain areas, so high performance aircraft were introduced in the role of FastFACs. These aircrews, who went by the call signs "Misty," then later "Storm," and "Wolf" in the Air Force, and "Playboy" in the Marine Corps, would fly at upwards of 400kts at altitudes below 5000' in order to evade enemy air defenses while acquiring targets. Visual scan patterns required discipline and training, and were outlined in unit SOPs. Additionally, Back-seaters would carry cameras to photograph target areas. After a target was located, it would be marked with rocket, artillery fire, or bombs from the FAC(A), to facilitate follow on attacks. It is estimated that between 10 and 20 missions were necessary before a FAC(A) would be proficient in a given area, and upwards of 60 missions were required before a FAC(A) would be considered experienced. [25]

Similar tactics were used in OAF, where FAC(A)s would combine information from advanced Intelligence, Surveillance and Reconnaissance (ISR) platforms with visual reconnaissance. They would often descend below the weather, and into Surface to Air Missile (SAM) and Air Defense

Artillery (ADA) threat envelopes, in order to locate and identify Serbian forces.[26] This trend demonstrates clearly that target detection and identification is a critical skill for FAC(A)s and JTACs alike, and as such, it should be a key component in any training program.

In order to be successful in terminal air control, and master all of the skill sets outlined above, it is necessary to have a dedicated team of specialists who excel in the field. Terminal Air Control is not something just anyone can do. This lesson was learned early on, and has remained constant throughout this mission set. During World War II, in the Pacific theater, it was noted that Marine Air Liaison parties were generally more effective than their counterparts in the Army Air Corps because Marine TACPs were headed by pilots, who understood the capabilities of aviation, and knew how to communicate effectively with combat aircraft.[27] During the Korean War, the U.S. Army repeatedly called upon Marine Tactical Air Control Parties (TACPs), and requested Marine CAS, instead of requesting Air Force support. The main reason given was that the Marines were focused on CAS, and that focus and dedication made them more effective. Doctrinally, the Air Force placed Close Air support third among its priorities, after air superiority and air interdiction, but even within the Air Force, the Mosquitoes understood the importance of specialization.[28]

During Vietnam, FAC(A)s received 6 months of dedicated training before arriving in theater, and then received training specific to their area of operations and supported unit once arriving in theater.[29] FastFAC units, such as the Mistys and Playboys, we're small units made up of elite pilots, Naval Flight Officers (NFOs), and aerial observers. Training in these units was intense, and standards were high, and these units focused exclusively on FastFAC missions. [30] During OAF, only FAC(A)s were allowed to descend below theater minimum altitude for visual reconnaissance and terminal control. To accomplish this mission, the FAC(A)s needed to execute

specific advanced tactics for ISR and terminal control in a threat environment.[31] Throughout history, it has become apparent that the complex and involved FAC(A) and JTAC missions should be carried out by dedicated specialists whenever possible. As such, our modern training and manning should reflect this.

Current JTAC and Joint FACA (JFACA) training standards are governed in joint memorandums of agreement (MOAs) signed initially in 2001 and 2003 respectively, and reviewed and updated every year. These two mission areas are the only tactical mission areas that have a joint training standard agreed upon by all of the services. This high degree of standardization is indicative of the importance of the certification.

Both MOAs outline general standards for the training of JTACs and JFACAs, and because the two mission areas are complimentary, the MOAs are very similar. In fact, the JFACA MOA mirrors the JTAC MOA in almost every respect. Within these documents, a JTAC is defined as follows:

> "A qualified (certified) service member who, from a forward position, directs the action of combat aircraft engaged in close air support and other offensive air operations. A qualified and current JTAC will be recognized across DOD as capable and authorized to perform terminal attack control."

The JTAC MOA then goes on to describe the training requirements for all JTACS, as well as the 8 duty areas of a JTAC:

1. Plan, develop and assess CAS requirements in support of the ground combat maneuver plan.
2. Plan CAS and suppression of enemy air defense (SEAD) missions in support of the ground combat maneuver plan, based on

knowledge of the enemy situation- ground order of battle (GOB) and air defense posture.
3. Conduct target analysis relative to CAS in order to make weaponeering recommendation for the employment of CAS in support of ground combat maneuver plan.
4. In preparation of CAS, advise the ground maneuver element commander on the proper employment of CAS assets in support of the ground combat maneuver plan.
5. Plan and coordinate CAS missions in support of the ground combat maneuver plan.
6. Request CAS missions in support of ground combat maneuver plan.
7. Provide terminal attack control of CAS missions in support of ground combat maneuver plan.
8. Conduct post-strike assessment for input in the development of battle damage assessment (BDA) and follow-on entry into the targeting process.

These duty areas are rather general, but within each of them are sub tasks that cover more specific duties. For example, a subset of Duty Area 3 is "Locate, validate, and recommend potential CAS targets for suitability in accordance with [Attack Guidance Matrix] AGM." Duty Area 6 has subtasks that cover general communications tasks, and Duty Area 7 includes general subtasks for controlling coordinate dependant weapons (such as the Joint Direct Attack Munition, or JDAM) and laser guided weapons. The JFACA MOA mirrors these duty areas and subtasks, but words them slightly differently, in order to adapt them to the FAC(A) mission.

With these MOAs as guidance, the services then adopt their own individual training programs to ensure that the training standards are met, and that the respective duty areas are accomplished. In the Marine Corps, the documents that guide this training are referred to as Training and Readiness (T&R) manuals, and they exist for each Type Model Series (TMS) in the air wing.

There is also a T&R specifically for Marine JTACS. It is within these T&R manuals that the training shortfalls begin to become apparent.

The USMC TACP T&R manual contains the syllabus for the training of all JTACS in the Marine Corps. It adapts the duty areas outlined in the JTAC MOA into training events, resources, and standards in order to outline how training and qualification in the duty areas should be achieved. The overwhelming focus of the syllabus is on ensuring proficiency with terminal control, which is defined as "the authority to direct aircraft into a position to deliver ordnance…to a particular target." The syllabus contains an initial academic phase, which includes simulator events and practical application, and then continues on to encompass 8 field events.

1. Fixed Wing(FW) CAS, Permissive Environment (2 events)
2. FW CAS, Restrictive Environment
3. Rotary Wing (RW) CAS
4. CAS w/ Continuous SEAD [Artillery suppression]
5. CAS w/ Interrupted or Non-Standard SEAD [Artillery Suppression]
6. CAS w/ Night Vision Devices (NVD) and/or infrared (IR)/Laser mark (2 events)

At the conclusion of these 8 field events, a JTAC is considered "Combat Capable," the Military Occupational Specialty (MOS) is awarded, and the unit commanding officer may issue a JTAC qualification letter. Following the Combat Capable phase, there are Full Combat Qualified and Advanced Training phases, but these are not required for qualification. The Full Combat phase, in addition to assault support and Casualty Evacuation (CASEVAC) events, contains a single Precision Guided Munition (PGM) event, although it doesn't specify any particular PGM, as well as a single FAC(A) integration event, although the specific task to be accomplished in concert with the FAC(A) is not specified.

Considering the historical lessons outlined above, it is clear that the minimum standards outlined in the TACP T&R are well off the mark. First and foremost, it is unsatisfactory that there are no PGM training requirements in the Combat Capable syllabus. There is a clear historical precedent, as well as a current need, for as much precision as is possible in the coordination of CAS attacks. Clearly, precision and accuracy are necessary when employing aviation ordnance in close proximity to ground forces in order to minimize the chances of fratricide. Further, history has repeatedly shown that JTACs are called upon to not only reduce the risk of fratricide, but to also reduce the risk of collateral damage. Reducing collateral damage is becoming increasingly important in modern combat, because destroying, damaging or killing the wrong thing can have a devastating effect on friendly information operations, as well as a detrimental effect on friendly political and military coalitions. The fact that no urban CAS training exists in the JTAC T&R syllabus prior to the Advanced Training phase further exacerbates this problem. It is absolutely essential, therefore, that JTACs become proficient with controlling all types of PGMs, both laser guided and coordinate dependant, prior to the completion of the Combat Capable phase.

Another major problem with the JTAC T&R is the limited emphasis on JTAC -FAC(A) and / or JTAC – Unmanned Aerial System (UAS) integration. Time and again history has shown when hunting the enemy, in either the tropical jungle or the urban jungle, that skilled aerial observation and disciplined air-ground communications are essential to success. Further, studies have shown that expanding the Situational Awareness (SA) of the JTAC is an essential element of success on the modern battlefield, as well as in the future, because of the increasing level of difficulty in finding the enemy.[32] One essential element to expanding the JTAC's SA is ensuring proficiency with all manner of modern air-ground communications, to include video and image links with

UAS and FAC(A) platforms. Therefore, it is necessary to update the JTAC T&R syllabus to include both FAC(A) and UAS integration events prior to the completion of the Combat Capable phase.

Addressing these shortfalls in the JTAC T&R, however, will require training resources, time, and money, which leads us into our discussion of the shortcomings in the Marine Corps FAC(A) T&R syllabi. The FW FAC(A) syllabus in the Marine Corps is contained in two manuals: The FA-18 T&R, and the AV-8B T&R. Both manuals contain the same training syllabus, albeit with different codes. The syllabus begins with an academic phase and 2 simulator events followed by 9 flight events. The 9 flight events required for initial FAC(A) qualification are as follows:

1. FW (PGM) control in a Low Threat environment
2. FW (General Purpose(GP) ordnance) Low Threat
3. RW(GP and PGM) control
4. FW and/or RW in an urban environment
5. Artillery air spot
6. Night FAC(A)
7. Basic combined arms integration (day)
8. Basic combined arms integration (night)
9. Advanced combined arms integration

Each of these events includes subtasks and performance standards that cover the specifics of aerial reconnaissance, marking accuracy, and air-ground communications. As such, the FW FAC(A) T&R covers many of the shortfalls apparent in the JTAC T&R. Where the problems begin to arise, however, is when the differences between the single-seat, and two-seat syllabi are examined.

For the two-seat FA-18D, the FAC(A) mission is part of the Mission Essential Task List (METL) for the platform. As such, the FAC(A) syllabus is part of the Core (or required) curriculum for two-seat crews, and a "D" squadron is required to have 8 FAC(A) qualified crews

(Pilot and WSO) in order to be considered a Combat Capable squadron. This requirement ensures that there is a relatively dense FAC(A) experience base within each of the 5 "D" squadrons, in keeping with historical precedent. In the single seat AV-8B and FA-18 A+/C T&Rs, however, FAC(A) is not one of the METLs, and as a result, the FAC(A) syllabus resides in the Core Plus(Optional) portion of the T&R syllabus, giving individual squadron commanding officers the discretion to determine how many FAC(A)s they should train.

This Core Plus syllabus creates two problems. First, it allows squadrons to train to the FAC(A) mission in a piecemeal fashion. With all of the training requirements levied on pilots in multi-purpose, multi-mission aircraft, it's exceptionally rare that anything "extra" will get done. So the likelihood that a dense FAC(A) experience base will develop and persist in a single seat squadron is fairly low, because FAC(A) training is an option, not a requirement. Historically, as has been outlined above, FAC(A)s have been organized into dedicated FAC(A) squadrons. This was generally necessary because of the demanding nature of the mission, the severity of the risk involved, and the resultant need for familiarity, teamwork, and focus. Piecemeal FAC(A) training violates what the Marine Corps has learned from historical experience, and is an inefficient use of limited FAC(A) training resources.

It is important to note that FAC(A) and JTAC training resources are so limited, in fact, that JTAC training and manning is managed and monitored at the General Officer level at both Headquarters Marine Corps and Joint Forces Command. Each of the JTAC and FAC(A) training events outlined above requires the support of one or more supporting arm: Mortars, Artillery, RW CAS, FW CAS, AC-130, UAS, etc. The lowest echelon of command in the Marine Corps that owns all of these various elements is the Marine Expeditionary Force (MEF), which is commanded by a 3 star General. As such, a great deal of coordination is required for JTAC and

FAC(A) training events to occur. For JTACs, the number of training slots is limited, and Headquarters Marine Corps has allocated JTACs and JTAC training based on the needs of the Marine Corps as a whole.

Such restrictions do not exist for FAC(A) training, however. As was stated previously, the current direction allows squadron commanders to train FAC(A)s, or not, as they see fit. FAC(A)s require the same training resources as JTACs, however. In truth, if the two syllabi are examined closely, it becomes apparent that a FAC(A) requires more than twice the number of resources a JTAC currently requires. As a result, the variable number of FAC(A)s created limits the assets that are available to currently produce JTACs, as well as the resources that would be available to improve JTAC training. In other words, every JDAM and LGB employed by a FAC(A) during a workup is one JDAM or LGB not available to a JTAC for qualification. The same holds true for artillery and mortar rounds, and FW and RW CAS sorties. If training resource constraints require that JTACs need to be allocated in accordance with the needs of the Marine Corps, and FAC(A)s require the same training resources for as JTACs, then why shouldn't FAC(A)s be allocated in accordance with the needs of the Marine Corps as well?

The net result is that both FAC(A) and JTAC training standards and manning requirements need to undergo a thorough review. At the grass roots level, everyone can see the advantages of having a JTAC or FAC(A) qualification. It would certainly be beneficial if every infantry squad leader and convoy commander was a qualified and proficient JTAC. Likewise, Marine Corps aviation would be far more effective if every flight lead was a qualified and proficient FAC(A). Resource constraints, however, prevent this from being possible, and as a result, priorities must be set. Not everyone who is capable, or who would benefit from FAC(A) or JTAC qualification, will have the opportunity to attain it. Further, history has shown that creating dedicated teams of

elite specialists, who focus on theses mission sets, is the most effective and efficient way to coordinate air power in support of maneuver forces.

Therefore, the Marine Corps must decide, at the highest levels, how many JTACS and FAC(A)s it needs to train and maintain, and what specific units will be responsible for accomplishing that training. Modern advances in technology, such as Rover video downlinks, digital imagery transfer, and UASs allow for JTACs to have enhanced situational awareness, and generally reduce the need for FAC(A)s. As a result, the Marine Corps should focus on training more JTACs, and making them better. Further, because the situations where a FAC(A) will likely be required in the future are somewhat limited, and likely involve a high degree of risk, the remaining FAC(A)s should reside in squadrons where FAC(A) training is a core skill, and where the training and proficiency standards are high. History has shown, time and again, that the risks involved in air-ground coordination can be severe, and history will judge if we make the right choices in the future.

[1] Smith, Peter C. *Close Air Support: An Illustrated History, 1914 to the present.* New York: Orion Books, 1990
[2] Cleveland, W.M. *Mosquitos in Korea.* Portsmouth, NH: Peter E Randall Publisher, 1991
[3] (Smith 1990) (Cleveland 1991)
[4] (Smith 1990)
[5] Werrell, Kenneth P. *Did USAF Technology Fail in Vietnam? : Three Case Studies.* Spring 1998. http://www.airpower.maxwell.af.mil/airchronicles/apj/apj98/spr98/werrell.html (accessed April 10, 2008)
[6] (Werrell Spring 1998)
[7] Grier, Peter. *Air Force Magazine Online : The JDAM Revolution.* Sept 2006. http://www.afa.org/magazine/Sept2006/0906JDAM.asp (accessed April 10, 2008)
[8] Alan J. Vick, Richard M. Moore, Bruce R. Pirnie, John Stillion. *Aerospace Operations Against Elusive Ground Targets.* Santa Monica, CA: RAND Corporation, 2001
[9] (Grier 2006)
[10] (Grier 2006)
[11] Tirpak, John A. *Air Force Magazine Online : Precision: The Next Generation.* November 2003. http://www.afa.org/magazine/nov2003/1103precision.asp (accessed April 10, 2008)
[12] LtCol Keith R. Gentry, USMC. "RCT-1 Fires in the Battle of Fallujah." *Field Artillery*, November-December 2005: 26
[13] (Grier 2006)
[14] (Grier 2006)
[15] (Smith 1990)
[16] Murray, Williamson. *German Military Effectiveness.* Baltimore, MD: The Nautical and Aviation Publising Company of America, 1992 100-105
[17] Murray, Williamson. *German Military Effectiveness.* Baltimore, MD: The Nautical and Aviation Publising Company of America, 1992 105
[18] Cooling, Benjamin Franklin. *Case Studies in the development of Close Air Support.* Washington, D.C.: Office of Air Force History, 1990
[19] Harrison, Marshall. *A Lonely Kind of War.* Novato, CA: Presidio Press, 1989. (Cleveland 1991)

[20] O'Rourke, Robert J. "Are our CAS tactics keeping up with shifting combat arenas?" *Marine Corps Gazette*, March 1977: 27
[21] Roberts, Col L. Ross. "Scoring a CAS toucdown." *Marine Corps Gazette*, December 2007: 16
[22] Fisher, Ernest F. *Combat Data Concerning the Effectiveness of Close Air Support.* Washington D.C.: Office of the Chief of Military History (Army), 1963
(Smith 1990)
[23] (Cleveland 1991)
[24] Robbins, Christopher. *The Ravens: The Men Who Flew in America's Secret War in Laos.* New York, NY: Simon & Schuster Inc., 1987
Lester, Gary Robert. *Mosquitos to Wolves:The Evolution of the Airborne Forward Ar Controller.* Maxwell, Alabama: Air University Press, 1997
(Smith 1990) (Harrison 1989)
[25] Adkinson, Col. J.L. "Who Were Those Guys? THE PLAYBOYS!" *Marine Corps Gazette*, May 1986: 96

Haun, LtCol Phil M. *Airpower vs a Fielded Force: Misty FACs of Vietnam and A-10 FACs of Kosovo- A Comparative Analysis.* SAASS Paper, Maxwell, Al: Air University Press, 2004
[26] (Haun 2004)
[27] Sherrod, Robert. *History of Marine Corps Aviation in World War II.* John D Lucas Printing Company, 1987.
(Smith 1990)
[28] Schlight, John. *Help From Above: Air Force Close Air Support of the Army 1946-1973.* Washington, D.C.: Air Force History and Museums program, 2003

(Cleveland 1991)

[29] (Harrison 1989)

[30] (Lester 1997) (Haun 2004) (Adkinson 1986)

[31] (Haun 2004)

[32] Bruce R. Pirnie, Alan Vick, Adam Grissom, Karl P. Mueller, David T. Orletsky. *Beyond Close Air Support: Forging a New Air-Ground Partnership.* Santa Monica, CA: RAND Corporation, 2005

Adkinson, Col. J.L. "Who Were Those Guys? THE PLAYBOYS!" *Marine Corps Gazette*, May 1986: 96.

Alan J. Vick, Richard M. Moore, Bruce R. Pirnie, John Stillion. *Aerospace Operations Against Elusive Ground Targets.* Santa Monica, CA: RAND Corporation, 2001.

Breth, F. J. "All Marines have a stake in the future of Close Air Support." *Marine Corps Gazette*, May 1978: 30.

Bruce R. Pirnie, Alan Vick, Adam Grissom, Karl P. Mueller, David T. Orletsky. *Beyond Close Air Support: Forging a New Air-Ground Partnership.* Santa Monica, CA: RAND Corporation, 2005.

Campbell, Douglass N. *The Warthog and the Close Air Suport Debate.* Naval Institute Press: Annapolis, MD, 2003.

Cleveland, W.M. *Mosquitos in Korea.* Portsmouth, NH: Peter E Randall Publisher, 1991.

Cooling, Benjamin Franklin. *Case Studies in the development of Close Air Support.* Washington, D.C.: Office of Air Force History, 1990.

Fisher, Ernest F. *Combat Data Concerning the Effectiveness of Close Air Support.* Washington D.C.: Office of the Chief of Military History (Army), 1963.

Grier, Peter. *Air Force Magazine Online : The JDAM Revolution.* Sept 2006. http://www.afa.org/magazine/Sept2006/0906JDAM.asp (accessed April 10, 2008).

Harrison, Marshall. *A Lonely Kind of War.* Novato, CA: Presidio Press, 1989.

Haun, LtCol Phil M. *Airpower vs a Fielded Force: Misty FACs of Vietnam and A-10 FACs of Kosovo- A Comparative Analysis.* SAASS Paper, Maxwell, Al: Air University Press, 2004.

Key, Maj. John H. "More CAS for your dollar." *Marine Corps Gazette*, April 1974: 39.

Lester, Gary Robert. *Mosquitos to Wolves:The Evolution of the Airborne Forward Ar Controller.* Maxwell, Alabama: Air University Press, 1997.

LtCol Keith R. Gentry, USMC. "RCT-1 Fires in the Battle of Fallujah." *Field Artillery*, November-December 2005: 26-29.

Morrocco, John. *Rain of Fire: Air War, 1969-1973.* Boston, MA: Boston Publishing Company, 1985.

Murray, Williamson. *German Military Effectiveness.* Baltimore, MD: The Nautical and Aviation Publising Company of America, 1992.

O'Rourke, Robert J. "Are our CAS tactics keeping up with shifting combat arenas?" *Marine Corps Gazette*, March 1977: 27.

Robbins, Christopher. *The Ravens: The Men Who Flew in America's Secret War in Laos.* New York, NY: Simon & Schuster Inc., 1987.

Roberts, Col L. Ross. "Scoring a CAS toucdown." *Marine Corps Gazette*, December 2007: 16.

Schlight, John. *Help From Above: Air Force Close Air Support of the Army 1946-1973.* Washington, D.C.: Air Force History and Museums program, 2003.

Sherrod, Robert. *History of Marine Corps Aviation in World War II.* John D Lucas Printing Company, 1987.

Smith, Peter C. *Close Air Support: An Illustrated History, 1914 to the present.* New York: Orion Books, 1990.

Tirpak, John A. *Air Force Magazine Online : Precision: The Next Generation.* November 2003. http://www.afa.org/magazine/nov2003/1103precision.asp (accessed April 10, 2008).

Werrell, Kenneth P. *Did USAF Technology Fail in Vietnam? : Three Case Studies.* Spring 1998. http://www.airpower.maxwell.af.mil/airchronicles/apj/apj98/spr98/werrell.html (accessed April 10, 2008).